TTS-58
AXCA

NORTHEAST

15-58
AXCA

GENERAL ELECTRIC CO.
Instrumentation & Control
228 W. Florence Ave.
Inglewood, Calif. 90301

INSTRUCTION MANUAL

MODEL

TTS 58AXCA

COMPANDORED CIRCUIT ADAPTER

ISSUE 1
AUG. 1972

NORTHEAST ELECTRONICS CORPORATION
P.O. BOX 649 - CONCORD, N. H. 03301
AREA CODE 603 224-7466

PRINTED IN U.S.A.

PROPRIETARY NOTICE

The information contained in this publication is the property of Northeast Electronics Corporation and may not be reproduced or used for manufacturing purposes or disclosed to third parties without the written permission of Northeast Electronics Corporation.

WARRANTY

NEC warrants all products manufactured or sold by NEC to be free from defects in materials and workmanship, subject to the following terms and provisions.

NEC's obligations under this warranty are limited to repairing, adjusting, or replacing at our option, with reasonable promptness, any NEC product which shall within twelve (12) months after delivery to the original purchaser, and after normal and proper usage, prove to be defective on NEC inspection, provided that the purchaser shall have reasonably inspected products when received and notified NEC of any apparent defects discovered within fifteen (15) days of receipt of shipment. NEC shall not be liable for any manufacturing costs of the buyer, lost profits or good will of the buyer, or any other special or consequential damages sustained or expenses incurred by the buyer by reason of the use or sale of any defective NEC product.

No products may be returned to NEC except with our written permission. After receiving NEC factory authorization, material requiring repair or replacement should be sent prepaid to the factory accompanied by a written statement setting forth as completely as possible the defects and the conditions under which they occurred. Material delivered by NEC shall not be considered defective if it satisfactorily fulfills the buyer's performance requirements and/or is in accordance with approved samples. NEC's obligations on performance of products delivered shall be limited to complying with specifications accompanying a purchase order or with published specifications on standard catalog items. This warranty does not extend to any NEC products which have been subject to misuse, neglect, accidents or improper installation or applications, nor shall it extend to units which have been repaired or substantially altered outside the NEC factory, nor to any associated instruments, equipments or apparatus. This warranty is in lieu of all other warranties, express or implied.

TABLE OF CONTENTS

Section	Title	Page
1	DESCRIPTION	1-1
2	SPECIFICATIONS	2-1
3	OPERATION	3-1
4	ELECTRONICS PARTS LIST	4-1
5	SCHEMATIC DIAGRAMS	5-1

LIST OF ILLUSTRATIONS

Figure	Title	Page
1-1	TTS 58AXCA	1-0
2-1	Voice Filter Characteristics	2-1
2-2	Notch Filter Characteristics	2-2
3-1	Front Panel Controls	3-2
4-1	Front Panel Component Location Diagram	4-2
4-2	Voice Filter Component Location Diagram	4-3
4-3	Notch Filter Component Location Diagram	4-4
4-4	Oscillator Component Location Diagram	4-5
5-1	TTS 58AXCA Overall Schematic Diagram	5-2
5-2	Voice Filter, Schematic Diagram	5-3
5-3	Notch Filter, Schematic Diagram	5-4
5-4	Oscillator, Schematic Diagram	5-5

LIST OF TABLES

Table	Title	Page
2-1	Specifications	2-1
3-1	Operating Controls	3-1
4-1	List of Manufacturers	4-1
4-2	Overall Parts List	4-2
4-3	Voice Filter Parts List	4-3
4-4	Notch Filter Parts List	4-4
4-5	Oscillator Parts List	4-5

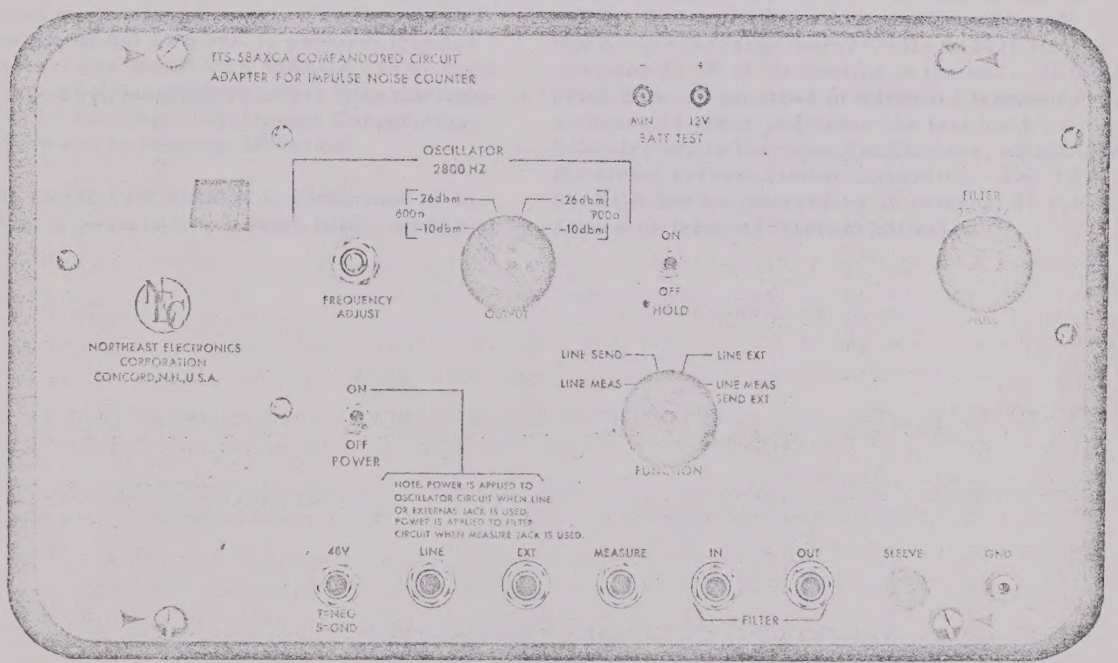


Figure 1-1. TTS 58AXCA

SECTION 1

DESCRIPTION

1.1 INTRODUCTION.

1.2 The Northeast Electronics Corporation Model TTS 58AXCA is the Compandored Circuit Adapter cover accessory for the Model TTS 58A. This accessory electrically disables the compandor circuit on carrier channels, making it possible for the Model TTS 58A to perform impulse noise tests. The Model TTS 58AXCA can be used in conjunction with equipment other than that manufactured by Northeast Electronics Corporation, e.g., the Western Electric Model 6A.

1.3 The Model TTS 58AXCA is comprised of an oscillator, a notch filter, a voice filter, switching circuitry, a hold circuit, and access circuitry. The oscillator is a stable RC type that generates a fixed frequency of 2800 Hz. A vernier control provides the fine adjustment of frequency from 2775 Hz to 2825 Hz and an output switch selects output levels of -10 dBm or -26 dBm at 600 or 900 Ω. The notch filter has an adjustable null that covers the range from 2775 Hz to 2825 Hz and provides 40 dB of attenuation at the null. An input voice filter is provided to minimize frequency components above and below the test band. A hold circuit, in the form of an inductor, establishes the direct current circuit connection. The TTS 58AXCA can be powered by an external 48 volt dc source or from its internal batteries.

SECTION 2

SPECIFICATIONS

2.1 INTRODUCTION.

2.2 Table 2-1 and figures 2-1 and 2-2 provide the specifications of the TTS 58AXCA.

Table 2-1. Specifications

OSCILLATOR	
OUTPUT FREQUENCY :	2800 Hz with vernier adjustment of ±25 Hz.
OUTPUT LEVEL :	-10 dBm or -26 dBm switched
OUTPUT IMPEDANCE :	600Ω or 900Ω ±5% switched
NOTCH FILTER	
NULL FREQUENCY :	2800 Hz adjustable ±1% (figure 2-2)
REJECTION AT NULL :	40 dB minimum
INPUT IMPEDANCE :	600Ω ±5%
VOICE FILTER (figure 2-1)	

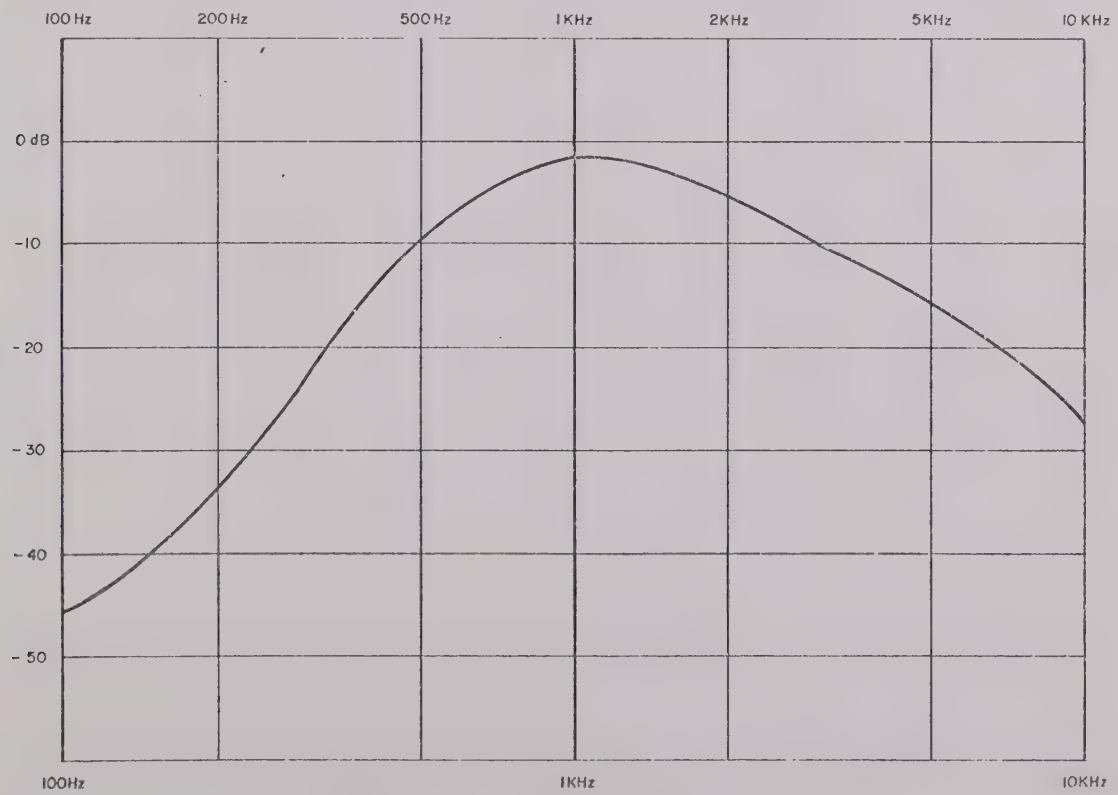


Figure 2-1. Voice Filter Characteristics

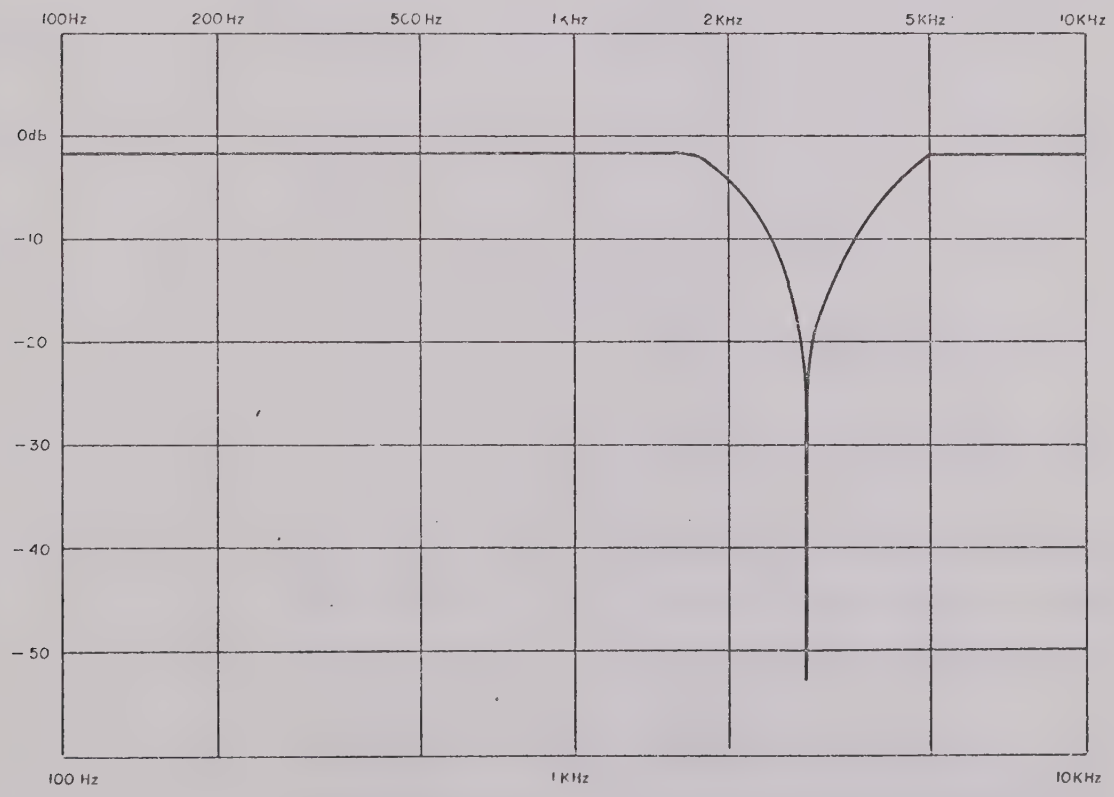


Figure 2-2. Notch Filter Characteristics

SECTION 3

OPERATION

3.1 INTRODUCTION.

3.2 Figure 3-1, in conjunction with table 3-1, provides the description of the operating controls and terminals of the Model TTS 58AXCA. Paragraphs 3.3 through 3.9 provide the operating instructions.

Table 3-1. Operating Controls

Reference Designation	Control, Indicator or Access Point	Function
J8	48 V jack	Connects the set to an external 48 volt source of power via a 310 ended two conductor cord.
J7	LINE jack	Connects the set to the facility under test via a 310 ended two conductor cord.
J6	EXT jack	Connects the set to external circuits (such as a dial) via a 310 ended two conductor cord.
J5	MEASURE jack	Connects the set to associated impulse noise counter's LINE jack via a 310 ended two conductor cord.
J4	FILTER IN jack	Connects the set to the associated impulse counter's FILTER IN binding post via a 310 ended two conductor cord.
J3	FILTER OUT jack	Connects the set to the associated impulse noise counter's FILTER OUT binding post via a 310 ended two conductor cord.
J2	SLEEVE binding post	Connects the set to the proper potential when sleeve control for holding circuits is required.
J1	GND binding post	Connects the chassis to the circuit common.
J10, J9	BATT TEST jacks	Connects the set to a voltmeter for internal battery checks.
R1, R2	FREQUENCY ADJUST control	Provides a fine adjustment of the internal oscillator's frequency.
R3	FILTER NULL control	Provides a fine adjustment of the internal notch filter's reject, or null, frequency.
S4	POWER switch	Controls the application of power to the set.
S3	HOLD switch	Controls the application of the hold inductor across the ring and tip of the LINE jack.
S1	FUNCTION switch	Controls the various internal circuit connections to the LINE, MEASURE and EXT. jacks.
S2	OUTPUT switch	Controls the output level and impedance of the internal oscillator circuit.

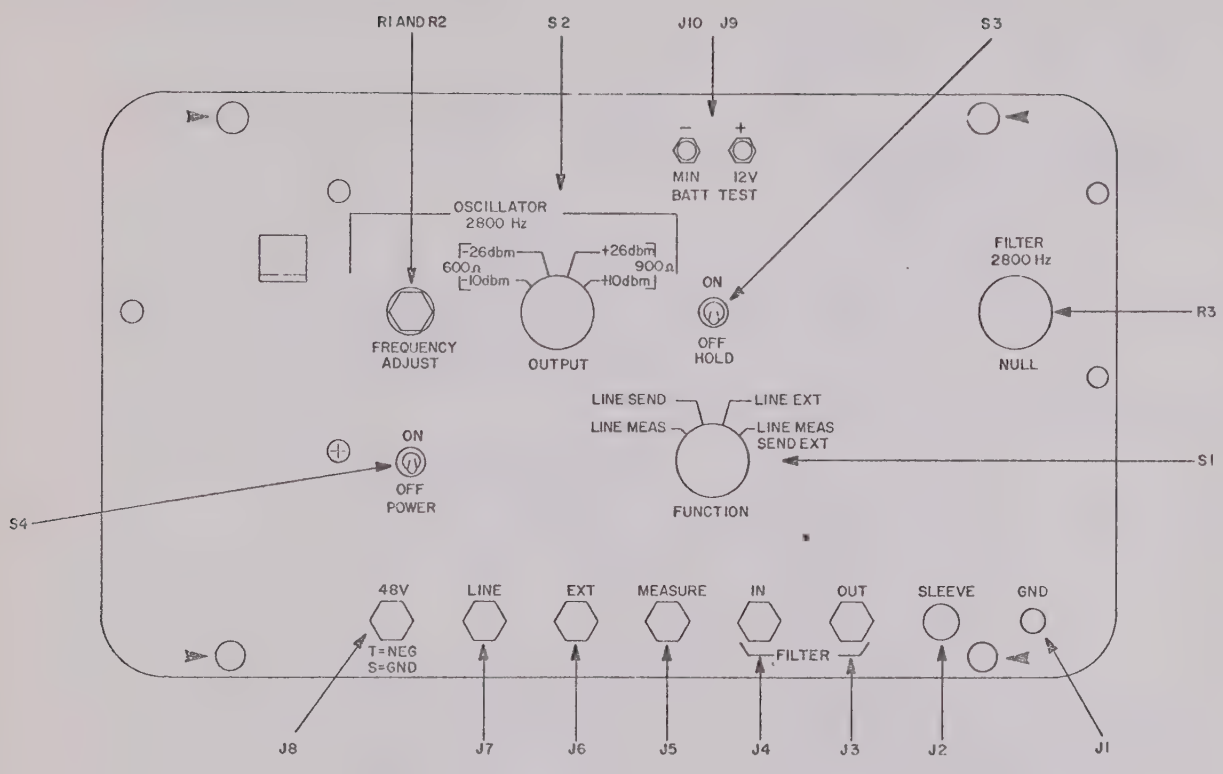


Figure 3-1. Front Panel Controls

3.3 BATTERY CHECK.

3.4 It is not necessary to check the condition of the batteries prior to each test. However, it is recommended that the batteries be checked periodically and particularly prior to the beginning of a long series of tests.

3.5 BATTERY CHECK PROCEDURE.

a. Connect a dc voltmeter across the two BATT TEST pin jacks. Observe the polarity marked on the panel.

b. Operate the POWER switch to the ON position, and insert a 310 plug into the LINE jack.

c. Note the voltmeter's reading. Fresh batteries correspond to a reading of 18 volts or slightly more. Aged, but adequate batteries correspond to readings between 12 and 18 volts, and unsatisfactory batteries correspond to readings below 12 volts.

d. Should battery replacement be necessary, use two Eveready type 2356N or equivalent.

3.6 INITIAL PROCEDURE.

a. Connect the LINE jack to the circuit under test via a two conductor cord (tip and ring) terminated with a 310 type plug.

b. Connect the MEASURE jack of the Model TTS 58AXCA to the line jack of an impulse noise counter via a two conductor cord (tip and ring) terminated with a 310 type plug.

c. If a dialed-up connection is required, connect a dial to the EXT jack via a two conductor cord (tip and ring) terminated with a 310 type plug.

d. Using the special five ended cord provided with the Model TTS 58AXCA, insert the red and black 310 type plugs into the FILTER IN and OUT jacks of the Model TTS 58AXCA respectively. Connect the yellow, red, and black banana plugs on the other end of the cord to the external filter binding posts GND, IN and OUT of the

associated impulse noise counter respectively.

e. Refer to the instruction manual furnished with the impulse noise counter for its proper calibration and switch settings.

f. Turn POWER ON.

3.7 FILTER ADJUSTMENT PROCEDURE.

a. With a 2800 Hz tone present at the LINE jack and the connections as described in paragraph 3.6, remove the black 310 plug from the FILTER OUT jack and insert a high impedance test receiver such as the Model TN 45 or equivalent.

b. Adjust the NULL control until a minimum level is detected in the test receiver.

c. Replace the receiver plug with the black plug removed in step a.

3.8 TO SEND 2800 HZ.

a. With the FUNCTION switch in the LINE SEND position, set the OUTPUT switch to the desired output level and impedance. The 2800 Hz tone will now be present on the tip and ring of the LINE jack. The EXT jack can be used to send the tone when the FUNCTION switch is in the LINE MEAS SEND EXT position.

Note : The FREQ ADJ control has been factory set at 2800 Hz ±2% and should not be readjusted without the aid of a frequency counter such as the Model TTS 80A or equivalent.

3.9 TO DIAL AND HOLD A CIRCUIT.

a. Connect a dialable trunk or circuit to the LINE jack.

b. Connect a dial to the EXT jack via a two conductor (tip and ring) cord terminated with a 310 type plug.

c. Operate the HOLD toggle switch to the OFF position.

d. Turn the FUNCTION switch to the LINE EXT position.

e. Dial the desired number.

f. Operate the HOLD toggle switch to the ON position. The FUNCTION switch can now be operated to any position without dropping out the dialed-up connection.

SECTION 4

ELECTRONICS PARTS LIST

4.1 INTRODUCTION.

4.2 Table 4-1 provides a cross index of all the manufacturers appearing in this parts list. Tables 4-2 through 4-5 provide the electronics parts list of the Model TTS 58AXCA. Figures 4-1 through 4-4 provide the component location diagrams.

Table 4-1. List of Manufacturers

FSCM Code	Manufacturer
00656	Aerovox Corp., New Bedford, Mass. 02745
01121	Allen Bradley, Milwaukee, Wis. 53024
01295	Texas Instruments Inc., Semiconductor Div., Dallas, Texas 75231
05397	Kemet, Div. Union Carbide Corp., New York, N.Y. 10017
09353	C&K Components Inc., Newton, Mass 02158
09653	IEI, Brooklyn, N. Y.
12065	Transitron Electronic, Boston, Mass. 02128
12697	Clarostat Manufacturering, Dover, N.H. 03820
13606	Sprague Electric Co., Concord, N.H. 03301
15801	Fenwall Electronics Inc., Framingham, Mass. 01701
16509	Voltronics Inc., Chicago, Ill. 60634
18324	Signetics Corp., Sunnyvale, Calif. 94086
19701	Electra/Midlands, Mineral Wells, Texas 76067
22650	Whale Electronics, Nashville, Tenn.
27735	F-DYNE Electric Co., Fairfield, Conn. 06430
49956	Raytheon Co., Lexington, Mass. 02173
53021	Sangamo Electric Co., Springfield, Ill. 62705
71590	Centralab, Milwaukee, Wis. 53201
71744	Chicago Miniture Lamp, Chicago, Ill. 60640
72136	Electro Motive Mfg., Willimantic, Conn. 06226
72982	Erie Technological Products, Erie, Pa. 16512
73138	Beckman Instruments Heli-Pot Div., Fullerton, Calif. 92634
80223	United Transformer Co., N.Y., N. Y. 10013
81073	Grayhill, Inc., La Grange, Ill. 60525
82389	Switchcraft Inc., Chicago, Ill. 60630
83330	Herman H. Smith Inc., Brooklyn, N. Y. 11027
86632	Newton Engineering, Newton, Mass. 02161

Table 4-2. Overall Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE POWER VOLT	MFGR.	MFGR. PART NO.	N. E. C. #
	PC Brd E95269			B005850005
	PC Brd E95268			B005850006
	E-95270 PC Brd			B005850007
BT1, BT2	Batteries, NEDA1612	25312	2356N	910000700
C2	C: 2.2μF, 10%, 100V	22650	11-312-2.2-100-8NA	301302250
DS1	Lamp T-2	71744	NE-2	730000600
J1, J2	Jack, black tip	49956	TJ105BL	650600100
J3, J4	Jack, tel. type schem .3	82389	L12B	650100300
J5-J8	Jack, tel. type schem 23	82389	C-55B-SF	650200500
J9	Jack, metal gnd	83330	137SP	652500100
J10	Jack, blk	81073	29-1B	652400300
L1	Inductor	86632	TN-1274	450200200
R1, R2	R: dual 100, 10%, 2W	12697	CM31856NP	238001010
R3A, R3B	R: dual 100	16509	VOLTRONICS	238001011
S1	Switch, 2D 2ckt 5pos nonshort	71590	PA-022-3962	625101300
S2	Switch, 2D 2ckt 5pos nonshort	71590	PA-1003	625100200
S3	Switch, SPDT	09353	7101	620400100
S4	Switch, DPDT	09353	7201	620400600
T1	Transformer	80223	A-20	400200100

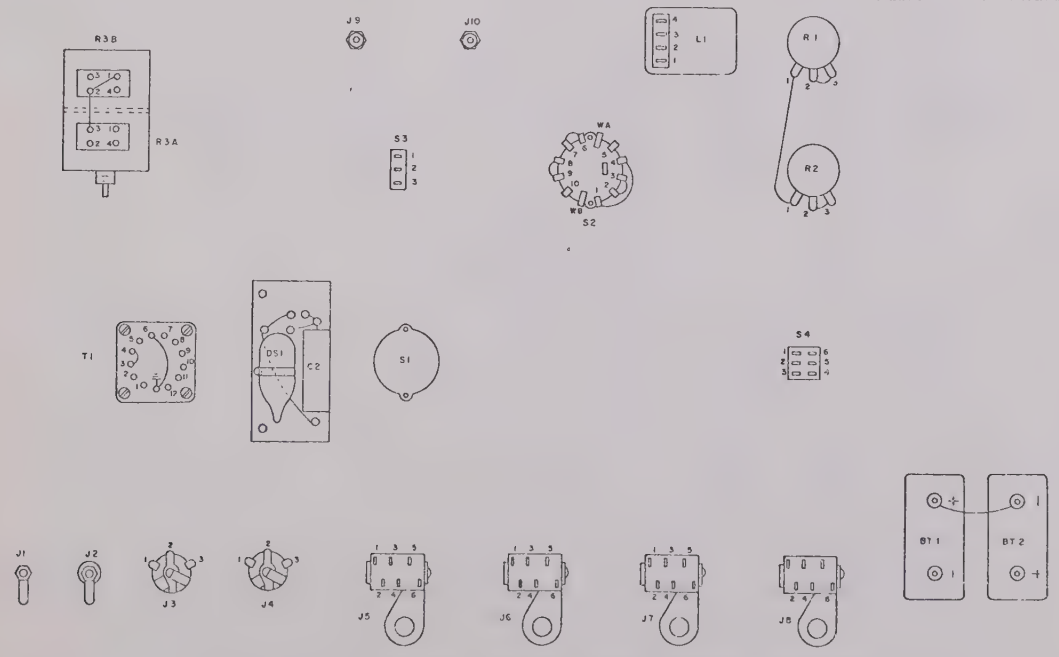


Figure 4-1. Front Panel Component Location Diagram

Table 4-3. Voice Filter Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE POWER VOLT	MFGR.	MFGR. PART No.	N. E. C. #
C301, C302	C: 0.5μF, 10%, 200V	00656	P82927N-2	320705040
C303	C: 0.1μF, 10%, 100V	13606	225P10491	320001040
C304	C: 0.047μF, 10%, 100V	13606	225P47391	320004730
CR301, CR302	Diode	12065	1N4148	560041480
L301, L302	Inductor	53021	ET204-1290-3	460101800
R301	R: 91, 5%, ½W	01121	TYPE EB	200209105
R302	R: 3.3K, 10%, ½W	01121	TYPE EB	200203326
R303	R: 91, 5%, ½W	01121	TYPE EB	200209105

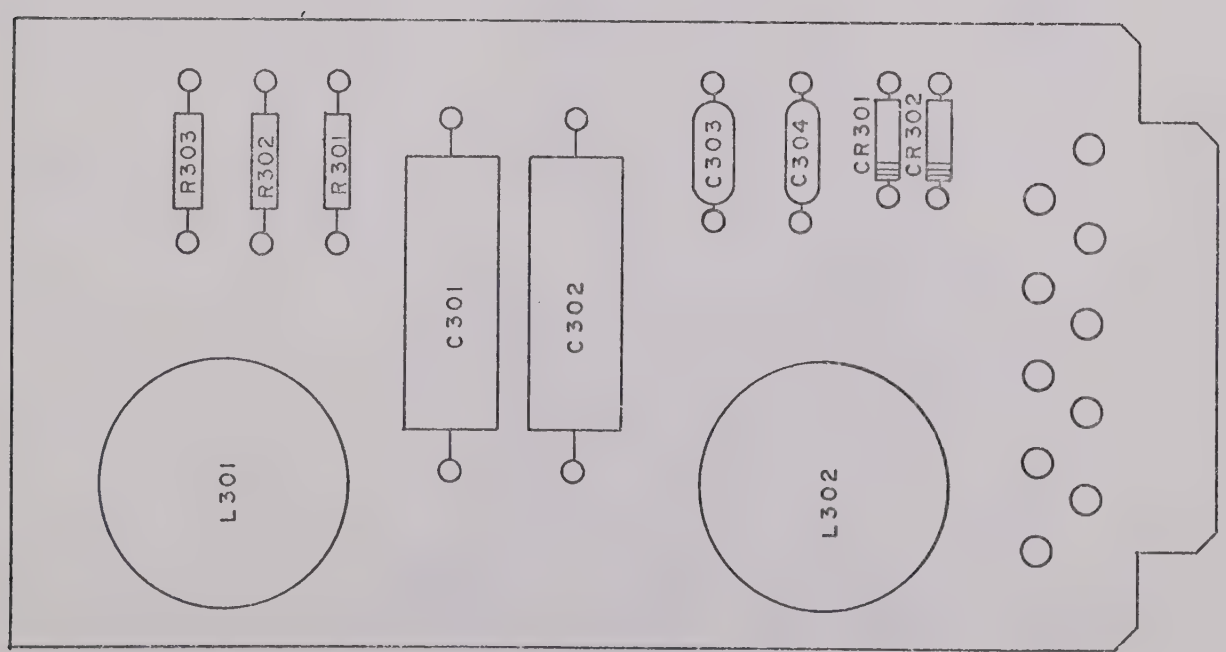


Figure 4-2. Voice Filter Component Location Diagram

Table 4-4. Notch Filter Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE POWER VOLT	MFGR.	MFGR. PART NO.	N. E. C. #
C1	C: 22μF, 10%, 25V	05397	K22E25	310402260
C2, C3	C: 0.01μF, 5%, 100V	27735	TYPE T	321501030
C4	C: 18000pF, 5%, 500V	72136	ELMENCO	335401830
C5, C6	C: sel. val. 5%, 500V	72316	CM15-	335000000
C7	C: 8-50pF, 10%, 200V	72982	539-002-34E	340105000
C8	C: 170μF, 10%, 6V	22650	16-437-170-6-8NA	301301770
C9	C: 22μF, 10%, 25V	05397	K22E25	301402260
C10	C: 20μF, 10%, 25V	09353	APD046	300902060
C11	C: 6.8μF, 10%, 20V	05397	T330A685K020AS	310006850
CR1	Diode	12065	1N4148	560041480
CR2	Diode	12065	1N4003	560040030
R1	R: 680, 1%, 1/8W	19701	MF5C	220268001
R2	R: 10K, 10%, ½W	01121	TYPE EB	200201036
R3	R: 12.1K, 1%, 1/8W	19701	MF5C	220212121
R4	R: 5.76K, 1%, 1/8W	19701	MF5C	220257611
R5	R: sel. val. 5W	01121	EB	200200000
R6	R: 5.76K, 1%, 1/8W	19701	MF5C	220257611
R7	R: sel. val. 5W	01121	EB	200200000
R8	R: 2740, 1%, 1/8W	19701	MF5C	220227411
R9	R: 100, 10%, ½W	73138	62P100	232701016
R10	R: 22K, 10%, ½W	01121	TYPE EB	200202236
R12	R: 1K, 10%, ½W	01121	TYPE EB	200201026
R13	R: 23.2, 1%, 1/8W	19701	MF5C	220223291
R14	R: sel. val. 5W	01121	EB	200200000
R15, R16	R: 22K, 10%, ½W	01121	TYPE EB	200202236
R17	R: sel. val. 5W	01121	EB	200200000
U1	Integrated circuit	18324	N5558V1	500055580

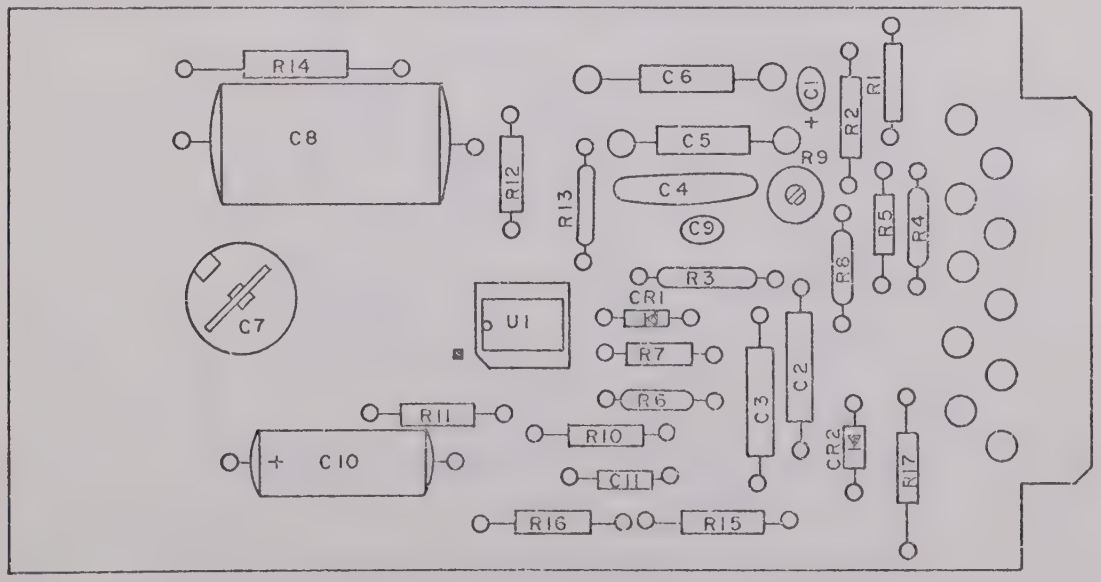


Figure 4-3. Notch Filter Component Location Diagram

Table 4-5. Oscillator Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE POWER VOLT	MFGR.	MFGR. PART NO.	N. E. C. #
C101	C: 6.8μF, 10%, 20V	05397	T330A685K020AS	310006850
C102	C: 20μF, 10%, 25V	09353	APD046	300902060
C103	C: sel. val. 5%, 500V	71236	CM15-	335000000
C104	C: 0.022μF, 10%, 100V	13606	225P22391	320002230
C106	C: sel. val. 5%, 500V	72136	CM15-	335000000
C107	C: 510pF, 5%, 500V	72136	CM15-E511J	335005110
C108	C: 220pF, 10%, 1KV	71590	DD-221	330002210
C109	C: 22μF, 10%, 6V	05397	T330A226K006AS	310002260
CR101	Diode	12065	1N4003	560040030
R101	R: sel. val. 10%, ½W	01121	EB	200200000
R102, R103	R: 22K, 10%, ½W	01121	TYPE EB	200202236
R104-107	R: 2.49K, 1%, 1/8W	19701	MF5C	220224911
R108	R: 1.5K, 10%, ½W	01121	TYPE EB	200201526
R109	R: 100, 10%, ½W	71450	UPE200RE1	231301010
R110	R: 226, 1%, 1/8W	19701	MF5C	220222601
R111	R: 200, 1%, 1/8W	19701	MF5C	220220001
R112	R: 3010, 1%, 1/8W	19701	MF5C	220230111
R113	R: 64.9, 1%, 1/8W	19701	MF5C	220264991
R114	R: 1000, 1%, 1/8W	19701	MF5C	220210011
R115	R: 32.4, 1%, 1/8W	19701	MF5C	220232491
R116	R: 54.9, 1%, 1/8W	19701	MF5C	220254991
R117	R: 750, 1%, 1/8W	19701	MF5C	220275001
R118	R: 340, 1%, 1/8W	19701	MF5C	220234001
R119	R: 19.1K, 1%, 1/8W	19701	MF5C	220219121
TH101	Thermistor	15801	GB38V2	290108020
U101	Integrated circuit	01295	SN72709N14P	500007090

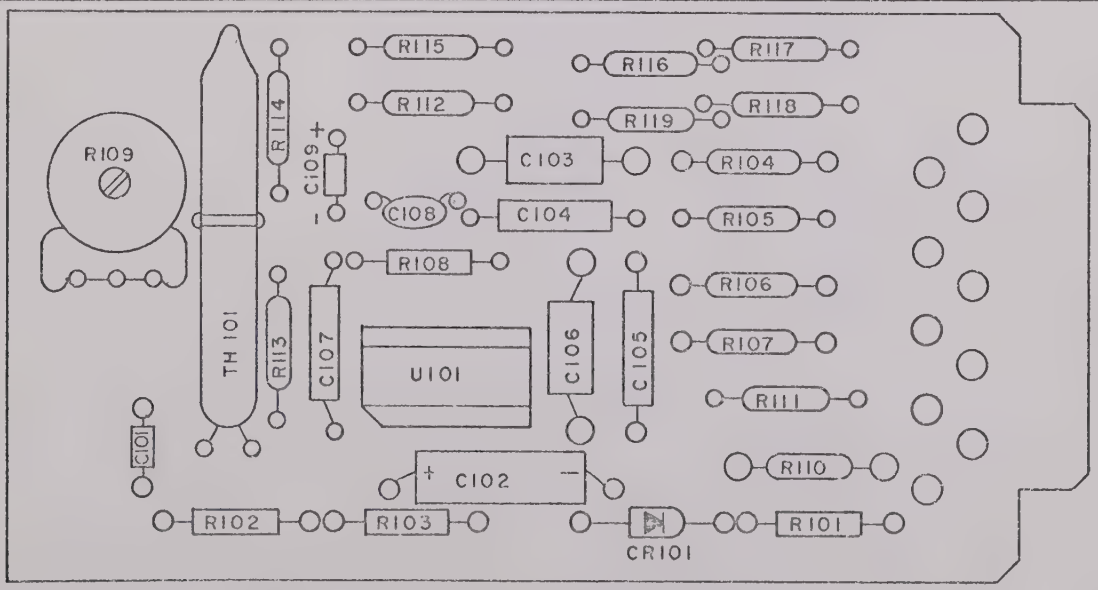


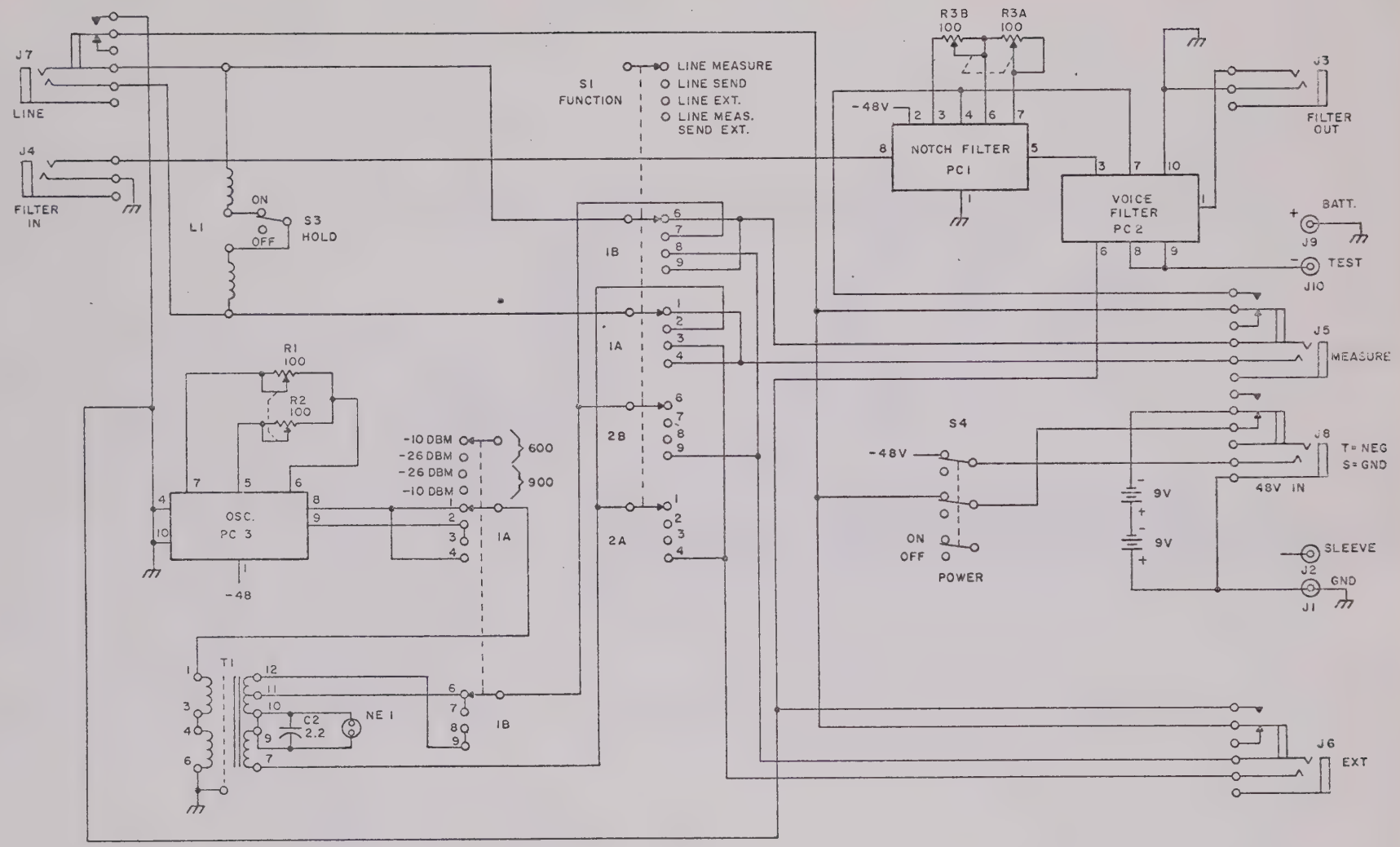
Figure 4-4. Oscillator Component Location Diagram

SECTION 5

SCHEMATIC DIAGRAMS

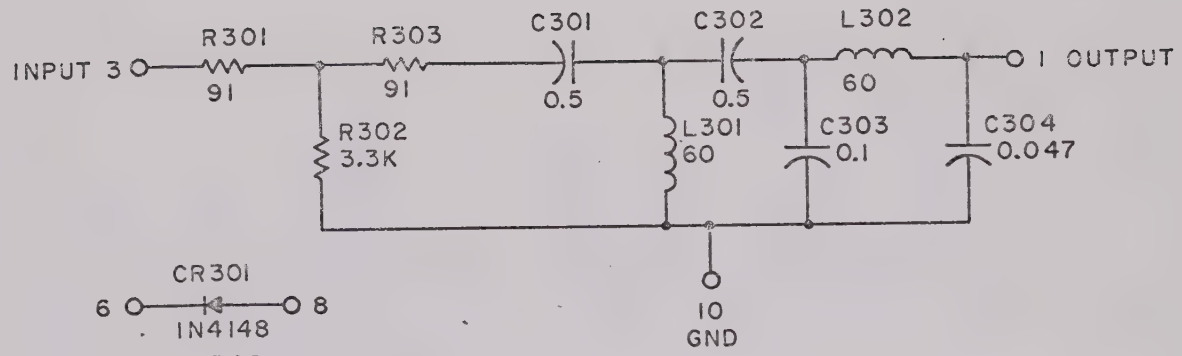
5.1 INTRODUCTION.

5.2 Figures 5-1 through 5-4 provide the schematic diagrams of the Model TTS 58AXCA.



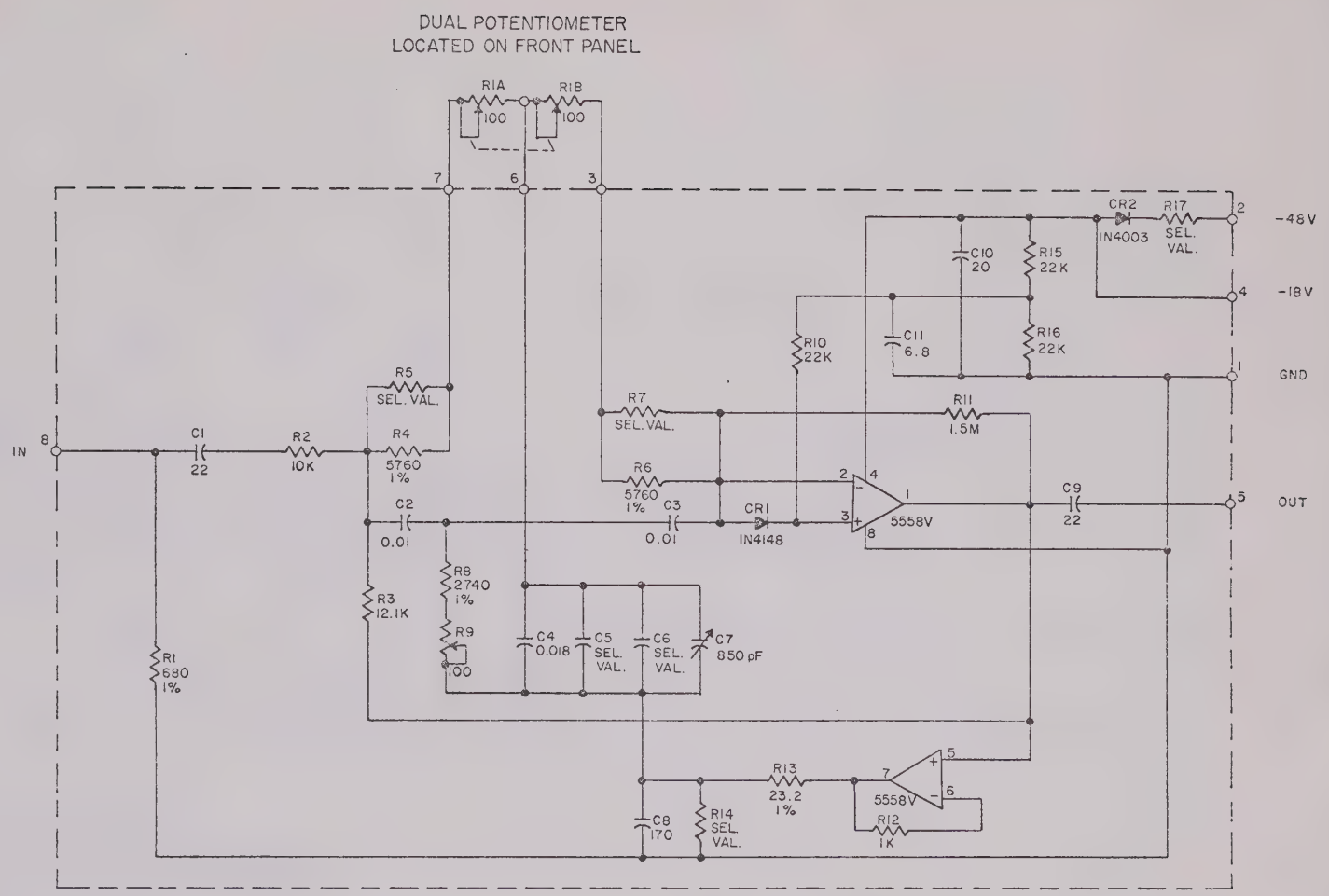
NOTES:
1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
   INDUCTANCE VALUES ARE IN MILLIHENRYS.

Figure 5-1. TTS 58AXCA Overall Schematic Diagram



NOTES:
1. UNLESS OTHERWISE INDICATED:
RESISTOR VALUES ARE IN OHMS.
CAPACITOR VALUES ARE IN MICROFARADS.
INDUCTANCE VALUES ARE IN MILLIHENRYS.

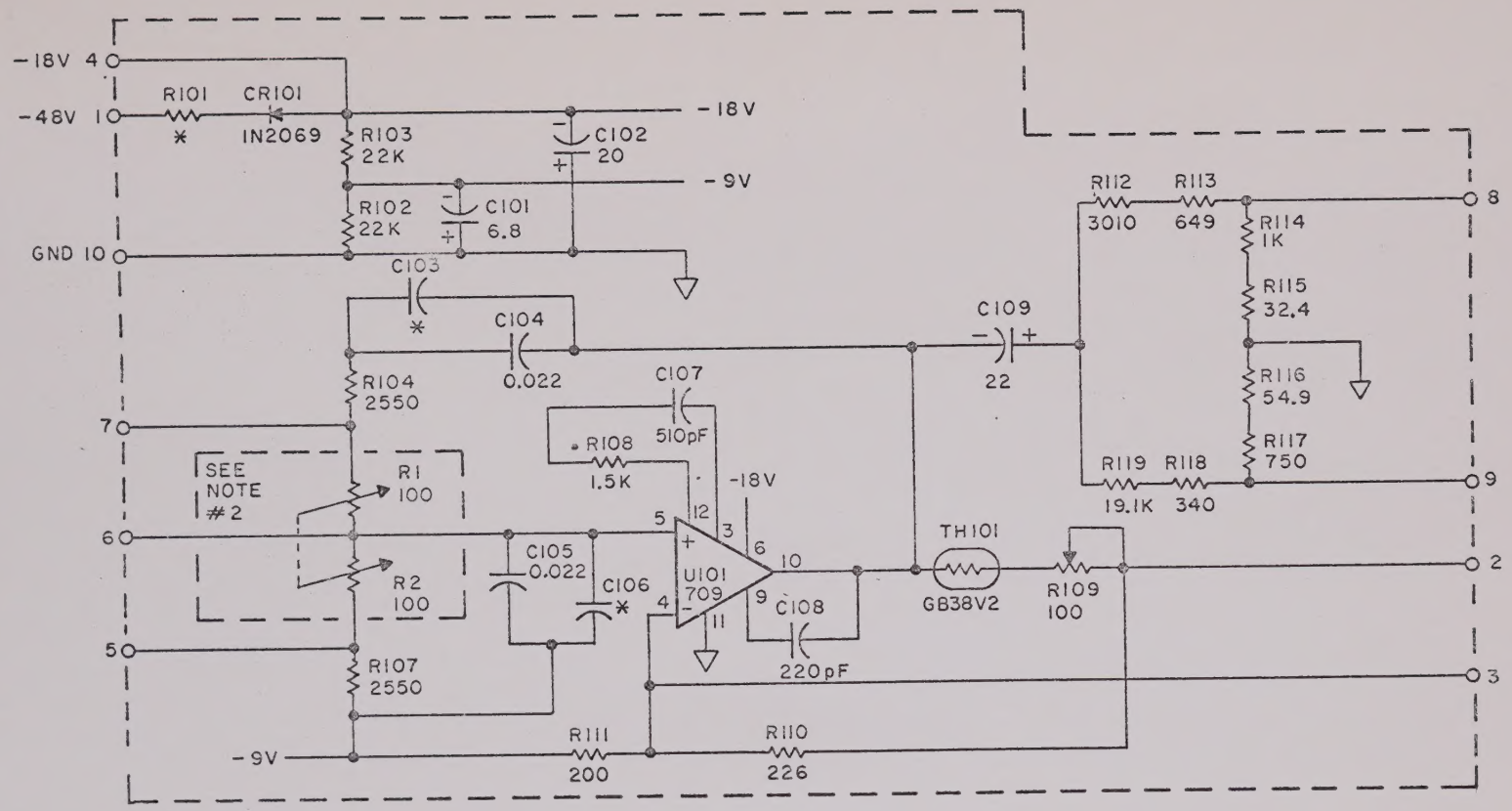
Figure 5-2. Voice Filter, Schematic Diagram



NOTES:

1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
   INDUCTANCE VALUES ARE IN MILLIHENRYS.

Figure 5-3. Notch Filter, Schematic Diagram



NOTES:

1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
   INDUCTANCE VALUES ARE IN MILLIHENRYS.
2. R1 & R2 ARE PHYSICALLY LOCATED ON FRONT PANEL

* SELECTED VALUES

Figure 5-4. Oscillator, Schematic Diagram